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AGENCY OF NATURAL RESOURCES

DEPARTMENT OF FORESTS, PARKS AND RECREATION

STATE OF VERMONT

FOREST INSECT AND DISEASE CONDITIONS

SOUTHERN REGION

CALENDAR YEAR 1991

PREPARED BY: Barbara S. Burns, Specialist
Forest Resource Protection

John P. Barrows
Nathan J. Fice
Allan D. Sands
Forest Resource Protection
Technicians

INTRODUCTION

The information in this report is based largely on aerial surveys to detect defoliation, dieback, and mortality, as well as ground surveys and observations of Forest Resource Protection personnel and other forestry staff.

Complete aerial surveys were flown in early June, mid-July, and late August. A partial survey was flown in mid-September to map additional defoliation by maple leaf cutter, hemlock looper, and birch defoliators.

Diagnostic assistance was provided by the University of Vermont, the U.S. Forest Service, the Maine Forest Service, and the University of Pennsylvania.

WEATHER SUMMARY

Spring was generally warm, bringing on rapid budbreak and leaf development. Plentiful moisture during the two previous growing seasons caused leaves to be large and dark green this spring. June was extremely dry. Hot, humid conditions continued throughout the summer, with enough light showers to keep things growing. The water table had dropped considerably by mid-summer, and the effects of the dry conditions are expected to show up on generally wet or droughty sites over the next couple of years. Ample rain in the fall did help replenish the water table.

Adequate moisture going into the flowering season, followed by dry conditions during flowering, led to good fruit development on many species, including oak, beech, and apple.

Weather conditions are summarized in Figure 1. Phenology is summarized in Table 1.

FOREST INSECTS

Hardwood Defoliators

Birch Defoliation, caused by **Birch Skeletonizer**, *Bucculatrix canadensisella*, **Birch Leaf Folders**, *Ancylis discigerana* and *A. nubeculana*, and **Birch Leaf Miners**, mostly *Messa nana*, was widespread late in the season. Five thousand acres of defoliation were mapped (Map 1). Additional light to moderate defoliation occurred almost anywhere birch was found. A monitoring plot was established in Granville State Forest to follow the impact on tree condition. Defoliation in that area averaged over 80%.

Forest Tent Caterpillar, *Malacosoma disstria*, larvae were observed in Shrewsbury and Mendon. However, no defoliation was observed. Pheromone traps were put out in Bethel, Sherburne, and Barnard. Results will be summarized in the final report.

Gypsy Moth, *Lymantria dispar*, defoliation declined, with only 2,710 acres mapped from the air (Map 1, Table 2). All of the damage occurred in Bennington and Rutland Counties. Although the summer was dry, most areas refoliated completely. However, oak dieback and mortality have begun to show up in a few areas which have had several years of defoliation.

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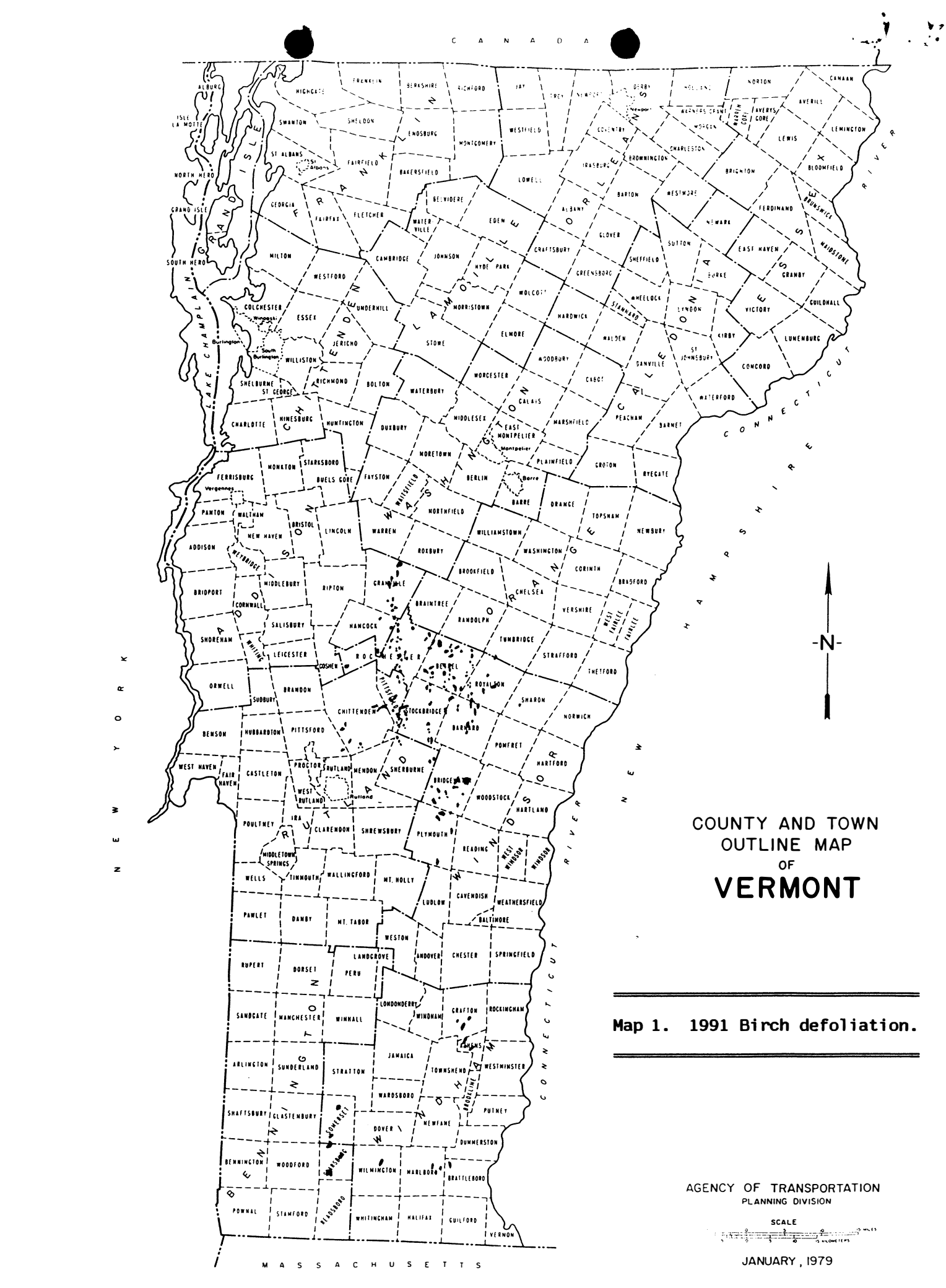
Table 1. 1991 Growing Degree Days and Observations of Phenological Development.

Week Ending	Growing Degree Days:* Burlington 1991	Phenology**			
			Other Plants		
		Sugar Maple	Budswell	Leaves	Flowers
4/14	91		Elm	Willow	Red Maple Popple
4/21	102	Budswell		Cherry	
4/28	150	Leaves Flowers	Red Oak Beech		Shadbush Birch
5/5	194		Pine Candles 1-2"	Red Maple Oak Basswood	
5/13	269	Full Size	Hemlock Spruce	Ash Birch	Apples
5/20	345				
5/27	461		Full Green Up		

* 86/50 calculations based on NOAA Local Climatological Data.

** Observations from southeast Windsor County.


C A N A D A
M A S S A C H U S E T T S
N E W Y O R K
CONNECTICUT RIVER
NEW HAMPSHIRE
-N-
COUNTY AND TOWN
OUTLINE MAP
OF
VERMONT
Map 1. 1991 Birch defoliation.
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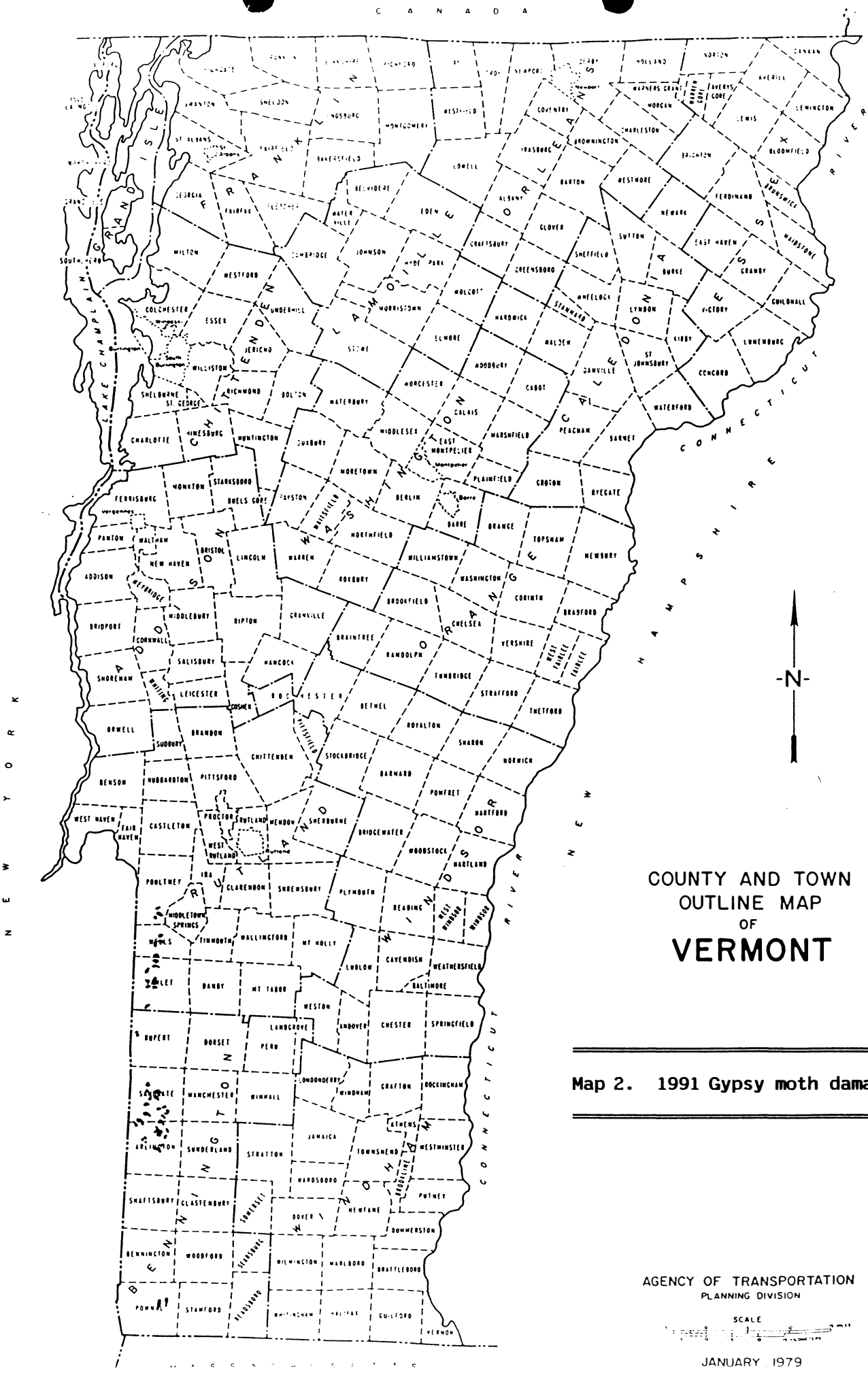

COUNTY AND TOWN OUTLINE MAP OF VERMONT

Map 2. 1991 Gypsy moth damage.

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Table 2. Mapped acreage of defoliation by gypsy moth.

	Light	Moderate	Heavy	Total
Arlington	--	852	222	1074
Rupert	48	66	--	114
Sandgate	144	492	192	828
Bennington County	**192**	**1410**	**414**	**2016**
Pawlet	66	180	168	414
Poultney	--	120	--	120
Wells	--	156	--	156
Rutland County	**66**	**456**	**168**	**690**
Total	**258**	**1866**	**582**	**2706**

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Diseased caterpillars and heavy parasitism on scattered egg masses indicate that the outbreak has ended in Rutland County. Although disease and parasitism were also widespread in Bennington County, there are occasional concentrations of egg masses which could cause some defoliation next year. Egg masses can occasionally be found throughout the region in northern hardwood areas of the Green Mountain range, where population buildup is not expected.

Egg mass counts in focal area plots reflect the general population decline (Table 3).

One 50-acre block of forestland in Pownal was sprayed with Dipel 8AF at a rate of 13 b.i.u. per acre. Good control was achieved.

Maple Leaf Cutter, *Paraclemensia acerifoliella*, populations increased, with 3,000 acres of defoliation mapped from the air, mostly in northern Windsor County (Map 3). Most of the heavy damage was not visible until the last week of August. Lighter damage could be found throughout the region, especially on regeneration.

Maple leaf cutter larvae were sampled in two locations in mid-June. A sugarbush in Pomfret averaged 6.7 live larvae and 1.1 dead larvae per leaf. A sugarbush in Hartford, which had been sprayed with Bt in 1990, averaged 0.5 live larvae and 0.03 dead larvae. The Pomfret sugarbush received heavy damage, while the Hartford sugarbush had only light defoliation.

Oak Leaf Tier, *Croesia semipurpurana*, was not observed causing any damage. The number of moths caught in the pheromone trap cluster in Rockingham increased substantially. No moths were caught elsewhere (Table 4).

Saddled Prominent, *Heterocampa guttivata*, populations declined. No defoliation was mapped from the air, and larvae were only occasionally observed. It is expected that a fungal pathogen is responsible for the collapse. Only four pupae were found in 25 1-sq.ft. samples in a sugarbush in Shrewsbury.

Pheromone traps were set out in Wilmington and Shrewsbury as part of a cooperative effort coordinated by the U.S. Forest Service to test different lures. Saddled prominent moths were caught in both locations.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
American Aspen Beetle *Gonioctena americana*			Not observed.
American Dagger Moth *Acronicta americana*			Not observed.
Birch Leaf Folder *Ancylis discigerana*			See narrative.

Table 3. Gypsy moth counts from focal area monitoring plots 1986-1991.[1, 2]

Plot Location	1986	1987	1988	1989	1990	1991
Minards Pond	Ø	Ø	7	99	1Ø	Ø
Fort Dummer	2	Ø	1	1	Ø	Ø
Handley Mountain	1	1	4	417	7	2
Perch Pond	Ø	115	226	168	1	1
Rocky Pond	Ø	6	53	>4ØØ	11	Ø
Petersburg	1	Ø	1	296	89	51
Tate Hill	Ø	Ø	6	498	5	25
Arrowhead[3]	5	21	48	96	3	
Brigham Hill[4]	1Ø	37	28	74	212	
Middlesex	Ø	Ø	1	19	23	
Sandbar	-	45	173	226	57	
Average	2	2Ø	46	2ØØ	38	

1. Total number in 15m diameter burlap-banded plots.
2. Average of 2 or 3 plots in 1986 and 2 plots in 1987-1991.
3. Aerial sprayed with B.t. (Foray) in 1990.
4. Aerial sprayed with B.t. (SAN415) in 1988.

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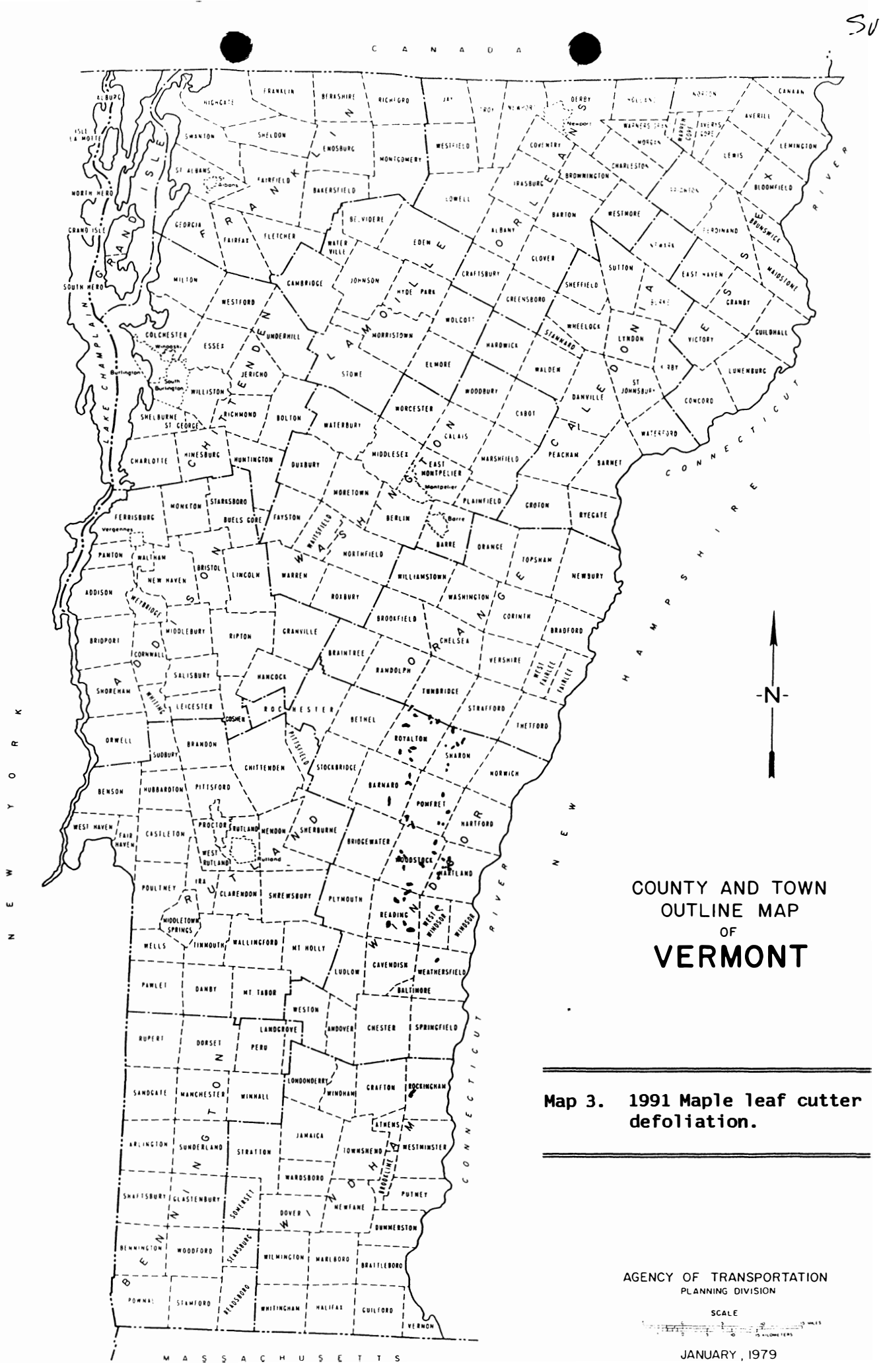

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Map 3. 1991 Maple leaf cutter defoliation.

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Table 4. Oak leaf tier in pheromone traps 1988-1991.

Location	# of Moths/Trap*			
	1988	1989	1990	1991
Brattleboro	40	0	1.3	0
Brigham Hill	--	--	0.3	--
Rockingham	60	0	1.3	26
Rupert	--	0	0	0
Sandbar	--	--	0	--

* Average of three traps, except Rockingham in 1988.

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OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Birch Skeletonizer *Bucculatrix canadensisella*			See narrative.
Blackheaded Ash Sawfly *Tethida cordigera*	White Ash	Readsboro	Noticeable defoliation along roadside.
Bruce Spanworm *Operophtera bruceata*	Sugar Maple	Throughout	Moths frequently reported from locations throughout the region.
Cecropia Moth *Hyalophora cecropia*	Apple	Poultney	Individual larvae.
Cherry Scallop Shell Moth *Hydria prunivorata*	Black Cherry	Brattleboro Wilmington Woodford	Some heavy defoliation but less than 1990.
Dogwood Sawfly *Macremphytus sp. (prob. tarsatus)*	Dogwood Lilac	Chester Grafton Wallingford	Ornamentals.
Early Birch Leaf Edgeminer *Messa nana*			See narrative.
Eastern Tent Caterpillar *Malacosoma americanum*	Cherry Apple	Throughout	Nests less common than previous years.
Elm Leaf Beetle *Pyrrhalta luteola*	Elm	Throughout	Heavy damage to elms along riverbank in Arlington.
Elm Leaf Miner *Fenusa ulmi*			Not observed.
Fall Cankerworm *Alsophila pometaria*			Not observed.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Fall Webworm *Hyphantrea cunea*	Cherry	Throughout, especially along roadside and field edges.	Marked increase. Causing complete defoliation in Brattleboro and Guilford. Damage visible from the air.
Flat Leaf Tiers *Psilocorcis sp.*			Not observed.
Forest Tent Caterpillar *Malacosoma disstria*			See narrative.
Green Striped Mapleworm *Anisota rubicunda*	Sugar Maple	Shrewsbury	Individual larvae.
Gypsy Moth *Lymantria dispar*			See narrative.
Half Winged Geometer *Phigalia titea*			Not observed.
Japanese Beetle *Popillia japonica*	Ornamentals	Widespread	Less common than 1990.
Large Aspen Tortrix *Choristoneura conflictana*			Not observed.
Large Oak-Apple Gall *Amphibolips confluenta*	Red Oak	Throughout, especially Windham County	Commonly observed.
Linden Looper *Erranis tiliaria*	Hardwoods	West Rutland	Individual larvae.
Locust Leaf Miner *Odontata dorsalis*	Black Locust	Putney	Light to moderate damage.

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OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Maple Leaf Cutter *Paraclemensia acerifoliella*			See narrative.
Maple Trumpet Skeletonizer *Epinotia aceriella*	Sugar Maple	Throughout	Heavy in scattered locations in Windsor County where moths were commonly seen in June. Lighter damage elsewhere. Generally less damage than 1990.
Maple Webworm *Tetralopha asperatella*	Sugar Maple	Shrewsbury Marlboro	Individual larvae.
Mountain Ash Sawfly *Pristiphora geniculata*			Not observed.
Oak Leafroller *Archips semiferanus*			Not observed.
Oak Skeletonizer *Bucculatrix ainsliella*	Oak	Throughout, especially Windham County	Light defoliation in red oak stands.
Orange-humped Mapleworm *Symmerista leucitys*			Not observed.
Pear Sawfly *Caliroa cerasi*			Not observed.
Pin Oak Sawfly *Caliroa sp.*			Not observed.
Red-humped Oakworm *Symmerista canicosta*	Oak	Castleton	Individual larvae.

OTHER HARDWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Rose Chafer *Macrodactylus subspinosus*			Not observed.
Saddled Prominent *Heterocampa guttivata*			See narrative.
Satin Moth *Leucoma salicis*	Cottonwood	Rutland Winhall Royalton	Causing heavy defoliation, especially in riparian areas.
Solitary Leaf Roller *Sparganothis pettitana*			Not observed.
Solitary Oak Leaf Miner *Cameraria hamadryadella*			Not observed.
Spiny Elm Caterpillar *Nymphalis antiopa*	Willows Birches	Dover	Ornamentals.
Spring Cankerworm *Paleacrita vernata*		Brandon	
Uglynest Caterpillar *Archips cerasivoranus*			Not observed.
Whitemarked Tussock Moth *Orgyia leucostigma*	Hardwoods	Rutland County	Individual larvae.
Wood Sower Gall *Callirhytis seminator*	Red Oak	Brattleboro Vernon	Ornamentals.

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SOFTWOOD DEFOLIATORS

Hemlock Looper, *Lambdina sp.*, populations increased dramatically in 1991. Moths of the fall-flying hemlock looper, *L. fiscellaria* were commonly seen throughout the region. No damage is known to have occurred yet from this insect. Damage from the spring-flying hemlock looper, *L. athasaria*, was mapped on 1500 acres in southeastern Windham County, compared to about 10 acres of defoliation observed in 1990 (Map 4, Table 5).

Several additional stands which were defoliated in 1990 became apparent by spring of 1991. Damage became more obvious as damaged needles dried out and dropped. In all, the known damage in 1990 totals about 25 acres. Branch samples were taken from four of these stands in winter 1990-91 and analyzed by the Maine Forest Service. Samples from the three stands in Dummerston had no *L. fiscellaria* eggs. Samples from the stand in Vernon had <3 eggs per meter of branch, indicating that damage due to *L. fiscellaria* would be moderate. All four stands had heavy defoliation in 1991.

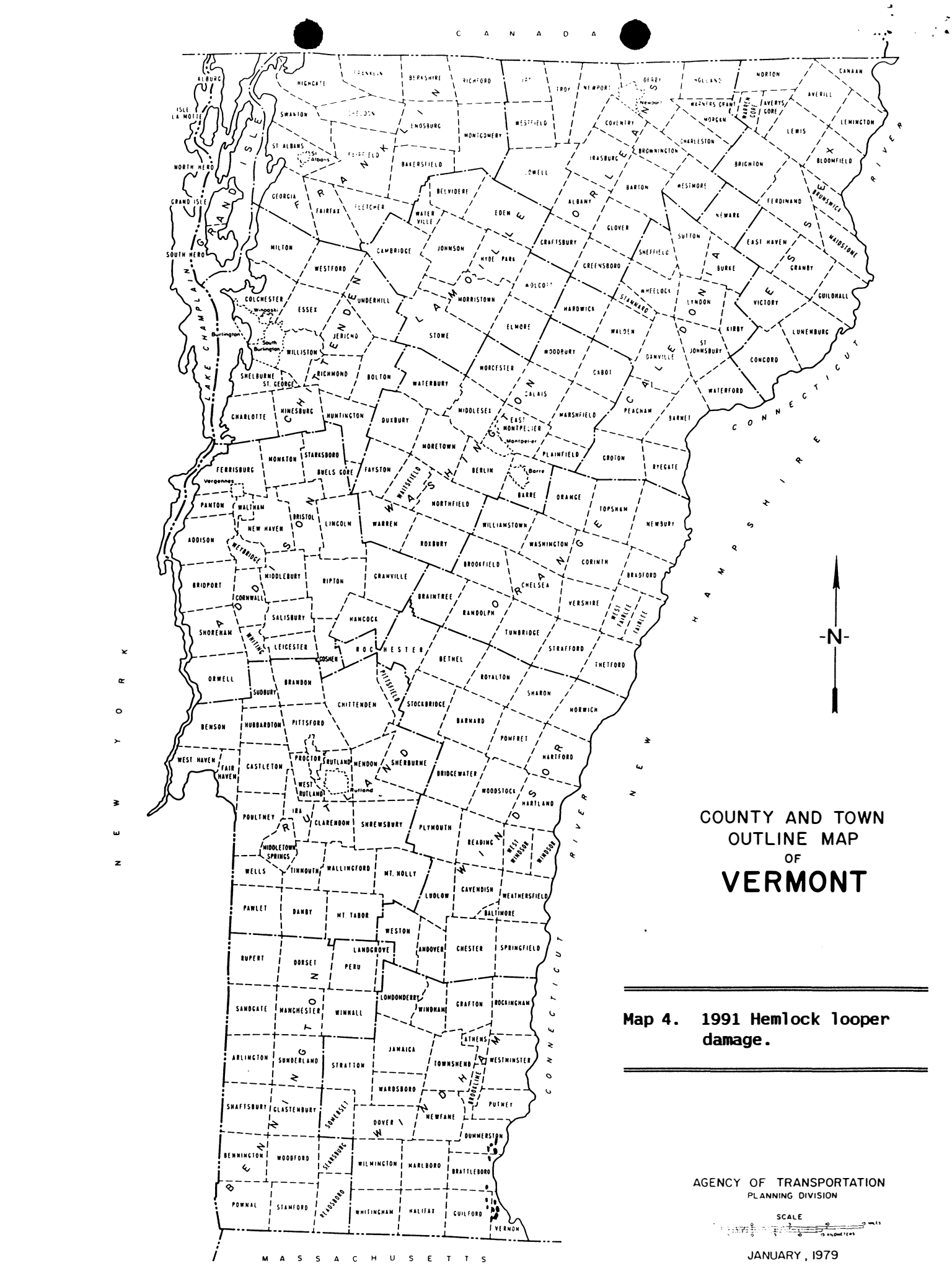
Clouds of *L. athasaria* moths were seen in late May in stands which had been damaged the previous year. Larvae were first observed in mid-June, along with a number of unhatched eggs. Damage was not visible from the air during the third week of August, but approached 100% defoliation in some areas by September. Pupation was beginning by mid-September, and continued into October.

Hemlocks were salvaged in one stand that was damaged in 1990. Twenty trees in that stand had been marked to monitor survival through budbreak. Trees were dead by June if they were missing all of their old needles, and over 80% of their new needles, by April. Most trees survived through spring if they had complete defoliation of older needles, but only 50-75% of new foliage missing. However, these trees had dieback by early summer (Table 6).

In general, mortality is expected where 90% or more of the needles have been lost. A leaflet, "Hemlock Loopers in Vermont", is being developed to provide recommendations for managing the insect, based on current knowledge.

No method is known to predict defoliation by the spring-flying hemlock looper. Pupae can be found in the duff of defoliated stands, indicating that the insect will be present in 1992. Pupae were collected by the UVM Entomology Research Laboratory in four $1m^2$ plots located at the bases of each of three moderately defoliated hemlock trees in one stand in Dummerston. Litter and duff were hand sorted to a depth of about 2 cm. Fifty five, 33, and 17 pupae were recovered, providing an average of 8 pupae per square meter. Four fungal infected specimens were collected. Pupae were found in a variety of situations, including the upper compacted hemlock duff and attached to hardwood leaves deposited this year and in the previous year. They were often between layers of damp decaying hardwood leaves.

Surveys will be conducted to assess populations of both the fall-flying and the spring-flying loopers, and to evaluate the impact of existing defoliation.



COUNTY AND TOWN OUTLINE MAP OF VERMONT

Map 4. 1991 Hemlock looper damage.

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Table 5. Mapped acreage of defoliation by hemlock looper.

Town	Acres Mapped
Brattleboro	70
Dummerston	430
Guilford	170
Vernon	870
Total	1540

Table 6. Condition of hemlocks in late May 1991 following hemlock looper defoliation in 1990.

% Defoliation by April		Condition in Late May (# of Trees)		
New Foliage	Old Foliage	Dead	with Top Dieback	with New Shoots Throughout
90-100	100	6	0	0
70-75	100	2	4	1
50-60	100	0	6	0
<50	100	0	0	1

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OTHER SOFTWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Arborvitae Leaf Miner *Argyresthia thuiella*	Arborvitae	Rutland	Scattered damage to ornamentals.
Balsam Fir Sawfly *Neodiprion abietis*			Not observed.
Green Hemlock Needleminer *Coleotechnites apicitripunctella*			Not observed.
Gypsy Moth *Lymantria dispar*			See Hardwood Defoliators.
Hemlock Looper *Lambdina fiscellaria*			See narrative.
Introduced Pine Sawfly *Diprion similis*	Scots Pine	Hubbardton	Moderate damage to Christmas trees.
Larch Casebearer *Coleophora laricella*	Tamarack	Rutland	Damage down from 1990.
Larch Looper *Semiothisa sexmaculata*	Larch	Shaftsbury	Light damage.
Larch Sawfly *Pristophora erichsonii*			Not observed.
Microbagworm *Psychidae*			Not observed.

OTHER SOFTWOOD DEFOLIATORS

INSECT	HOST(S)	LOCALITY	REMARKS
Orange Spruce Needleminer *Pulicalvaria piceaella*			Not observed.
Pine False Webworm *Acantholyda erythrocephala*			Not observed.
Pine Webworm *Tetralopha robustella*			Not observed.
Red-headed Pine Sawfly	Scots Pine	Bennington County	Light damage to Christmas trees in scattered locations.
Neodiprion lecontei	Mugho Pine	Brattleboro	Ornamentals.
Spruce Bud Moth *Zeiraphera canadensis*			Not observed.
Spruce Budworm *Choristoneura fumiferana*			Not observed.
Spruce Needleminer *Taniva albolineana*	White Spruce	Ludlow	Light damage to nursery trees.
White Pine Sawfly *Neodiprion pinetum*			Not observed.
Yellow-headed Spruce Sawfly *Pikonema alaskensis*			Not observed.

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SAPSUCKING INSECTS, MIDGES, AND MITES

Balsam Twig Aphid, *Mindarus abietinus*, populations increased, with damage occurring throughout the region. In occasional Christmas tree plantations where the population was not controlled, heavy sooty mold developed.

Eggs were sampled in two Christmas tree plantations. In Springfield, moderately damaged shoots averaged Ø.5 eggs per centimeter while shoots with no damage averaged Ø.1 eggs per centimeter, indicating that damage will be similar in 1992. In Pownal, shoots averaged Ø.2 eggs per centimeter, indicating that damage will remain light.

Hemlock Woolly Adelgid, *Adelges tsugae*, eradication continued at the site in Stockbridge where the insects were introduced in 199Ø. During a systematic survey in early May, six planted seedlings were found, of which one was infested. When the area was resurveyed in early November, seven planted seedlings were found, of which three were infested. A tiny wilding was also pulled. To date, one hundred and fifty-three planted trees have been pulled from the site and destroyed.

Nine native hemlock stands in the valleys around the introduction site were scouted, totalling about 5ØØ acres. No evidence of hemlock woolly adelgid was found.

To continue monitoring the state for other possible infestations, a sub-sample of the original survey plots is being checked. To date, two stands in Bennington County have been revisited. No adelgids were detected.

Pear Thrips, *Taeniothrips inconsequens*, damage to sugar maple was very light throughout the region due to low insect populations and rapid leaf flush. No defoliation was mapped from the air.

Average overwintering soil counts for the region were 1Ø% of the average counts in the winter of 1989-9Ø (Table 7). Bud counts, in the six sugarbushes which have been monitored since 1986, averaged .25 per bud, compared to 1.6 per bud in 199Ø (Figure 2). Additional bud counts were done in nine sugarbushes in Rutland County, and averaged .14 per bud.

Soil sampling was continued in September 1991 at the same sites which have been sampled since 1988. Results are not yet available.

Dieback is continuing in one sugar maple stand in Rupert that was severely defoliated by thrips in 1988, and damaged again in 1989. Droughty site conditions are responsible for the severity of losses and the length of recovery.

Spruce Spider Mite, *Oligonychus ununguis*, damage was widely observed. Damage from last years feeding showed up in scattered locations early in the season. While early damage was generally light, one white spruce Christmas tree plantation in Bennington County had heavy damage.

By late summer, heavy damage began to show up in a number of locations in Bennington and Windham Counties. Species affected included hemlock, arborvitae, larch, fraser fir and white spruce Christmas trees. The dry summer conditions are thought to be responsible for the sudden build-up of mites.

Table 7. Average number of live pear thrips adults in soil samples prior to spring emergence and subsequent acres of damage mapped during aerial survey.

County	Fall/ Winter 88-89 Avg. # of Live Thrips/Sample[1]	Spring '89 Acres Damaged	Fall '89 Avg. # of Live Thrips/Sample[1]	Spring '90 Acres Damaged	Fall '90 Avg. # of Live Thrips/Sample[1]	Spring '91 Acres Damaged
Addison	4.5	400	14.3	670	1.1	
Bennington	2.9	0	5.2	0	0.7	0
Caledonia	2.5	150	5.7	0	0.4	
Chittenden	11.9	870	12.2	1,300	1.3	
Essex	0.5	0	1.6	0	0.1	
Franklin	12.3}	140	18.1}	200	3.1	
Grand Isle	--}		4.0}		1.8	
Lamoille	15.5	680	7.1	8,990	2.0	
Orange	4.6	0	3.3	4,150	0.9	
Orleans	6.9	0	3.7	0	2.0	
Rutland	1.5	0	2.1	120	0.3	0
Washington	8.4	930	6.3	11,080	1.8	
Windham	3.0	0	6.9	3,250	0.6	0
Windsor	4.6	0	7.8	0	0.7	0

1. A sample is approximately 16 $in.^3$, taken with a bulb planter.

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OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Aphids *Cinara sp.*	Balsam Fir	Ludlow	Associated with ant damage to Christmas trees.
Aphids *Periphyllus sp.*			Not observed.
Arborvitae Aphid *Cinara tujafilina*	Arborvitae	Brattleboro	Ornamentals.
Balsam Gall Midge *Pardiplosis tumifex*	Balsam Fir	Widely scattered	Light damage only.
Balsam Twig Aphid *Mindarus abietinus*			See narrative.
Balsam Woolly Adelgid *Adelges piceae*	Balsam Fir	Mendon	
Beech Scale *Cryptococcus fagisuga*			See Beech Bark Disease.
Birch Budgall Mite *Aceria rudis*			Not observed.
Blister Mite *Eriophyes sp.*	Butternut	Brattleboro	Ornamentals.
Cooley Spruce Gall Adelgid *Adelges cooleyi*	Douglas Fir Blue Spruce	Widely scattered	Moderate damage to Douglas fir Christmas trees in Springfield and ornamentals in Vernon.
Cottony Maple Scale *Pulvinaria innumerabilis*			Not observed.

OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Eastern Spruce Gall Aphid *Adelges abietis*	Red Spruce White Spruce	Throughout	Damage to Christmas trees generally lighter than 1990.
European Birch Aphid *Euceraphis betulae*	White Birch	Poultney West Windsor Springfield	Ornamentals.
Fletcher Scale *Lecanium fletcheri*	Arborvitae	Rutland	Heavy on recently planted ornamentals.
Green Erineum Gall *Eriophyidae*			Not observed.
Hemlock Woolly Adelgid *Adelges tsugae*			See narrative.
Lacebugs *Corythucha sp.*	Sycamore Sugar Maple	Widespread	Heavy damage in scattered locations by mid-summer.
Leafhoppers			Not observed.
Lecanium Scale *Lecanium sp.*			Not observed.
Maple Spindle Gall Mites *Vasates aceris-crumena*	Sugar Maple	Chester	Ornamentals.
Oystershell Scale *Lepidosaphes ulmi*	Beech	Sherburne	On regeneration.
Pear Thrips *Taeniothrips inconsequens*			See narrative.
Pine Bark Aphid *Pineus strobi*	White Pine	Throughout	Remains heavy on individual trees in many locations, but less common than 1990.

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OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Pine Leaf Adelgid *Pineus pinifoliae*	White Pine	Throughout	Scattered dead shoots seen from 1990 feeding.
Pine Needle Midge *Contarinea baeri*			Not observed.
Pine Needle Scale *Chionapsis pinifoliae*	White Pine	Ludlow	Moderate infestation of nursery trees.
Pine Spittlebug *Aphrophora parallela*	Conifers	Throughout	Very common, but less than 1990. Widely observed on pines and hemlocks. Light damage in occasional Christmas tree plantations.
Pine Thrips *Gnophothrips sp.*			Not observed.
Pine Tortoise Scale *Toumeyella parvicornis*			Not observed.
Root Aphid *Prociphilus americanus*			Not observed.
Spruce Bud Scale *Physokermes piceae*			Not observed.
Spruce Spider Mite *Oligonychus ununguis*			See narrative.
Treehoppers *Membracidae*			Not observed.
Vein Pocket Gall *Macrodiplosis erubescens*	Red Oak	Dummerston	Single tree.

OTHER SAPSUCKING INSECTS, MIDGES AND MITES

INSECT	HOST(S)	LOCALITY	REMARKS
Woolly Alder Aphid *Prociphilus tessellatus*	Silver Maple Red Maple White Maple	Pittsfield Marlboro Fair Haven Rochester Newfane	Ornamentals.
Woolly Apple Aphid *Eriosoma lanigerum*			Not observed.

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OTHER BUD, SHOOT & STEM INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Allegheny Mound Ant *Formica exsectoides*	Balsam Fir	Ludlow	Causing mortality of Christmas trees.
Ambrosia Beetle *Scolytidae*			Not observed.
Balsam Shootboring Sawfly *Pleroneura brunneicornis*			Not observed.
Butternut Curculio *Conotrachelus juglandis*	Black Walnut	Pittsford	Ornamentals.
Coneworm *Dioryctria spp.*	White Spruce	Rutland	Light damage to Christmas trees.
Locust Borer *Megacyllene robiniae*	Black Locust	Rutland	Ornamental.
Maple Petiole Borer *Caulocampus acericaulis*			Not observed.
Northeastern Sawyer *Monochamus notatus*	White Pine	Winhall	Overwintering in dead trees associated with wet site and white pine blister rust.
Northern Pine Weevil *Pissodes approximatus*	White Pine	Bennington Pownal Shaftsbury	Attacking Christmas trees stressed by Zimmerman pine moth.
Pales Weevil *Hylobius pales*			Not observed.
Pine Gall Weevil *Podapion gallicola*			Not observed.

OTHER BUD, SHOOT & STEM INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Pine False Webworm *Acantholyda erythrocephala*	Scots Pine	Bennington	Heavy damage to Christmas trees.
Pine Root Collar Weevil *Hylobius radicis*			Not observed.
Pitted Ambrosia Beetle *Corthylus punctatissimus*			Not observed.
Round-headed Apple Tree Borer *Saperda candida*	Mountain Ash Apple	Chester Wallingford	Heavy damage to nursery trees.
Twig Pruner *Elaphidionoides villosus*			Not observed.
White Pine Weevil *Pissodes strobi*	Conifers	Throughout	Damage remaining constant. No heavy damage observed.
White Spotted Sawyer *Monochamus scutellatus*			Not observed.
Zimmerman Pine Moth *Dioryctria zimmermanni*	White Pine Scots Pine	Bennington Shaftsbury Sudbury Weston	Causing scattered mortality to Christmas trees.

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BARK BEETLES

INSECT	HOST(S)	LOCALITY	REMARKS
Bronze Birch Borer *Agrilus anxius*	White Birch	West Windsor Springfield Reading	Associated with dieback of recently planted trees.
Eastern Ash Bark Beetles *Hylesinus aculeatus*			Not observed.
Eastern Larch Beetle *Dendroctonus simplex*			Not observed.
Elm Bark Beetles *Hylurgopinus rufipes* *Scolytus multistriatus*			See Dutch Elm Disease.
Hemlock Borer *Melanophila fulvoguttata*	Hemlock	Dummerston Vernon	Occasionally seen in stands with hemlock looper damage.
Pine Engraver *Ips pini*	Red Pine White Pine Scots Pine	Middletown Springs Townshend Brattleboro	Associated with mortality on a wet site, and with wounding.
Red Turpentine Beetle *Dendroctonus valens*	Red Pine White Pine	Middletown Springs Norwich	Associated with pine mortality on wet sites.

ROOT INSECTS

INSECT	HOST(S)	LOCALITY	REMARKS
Broad Necked Root Borer *Prionus laticollis*			Not observed.
Conifer Swift Moth *Korsheltellus gracilis*			Not observed.
Wireworms *Elateridae*			Not observed.
June Beetle *Phyllophaga spp.*			Not observed.

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FOREST DISEASES

Stem Diseases

Beech Bark Disease, caused by *Cryptococcus fagisuga* and *Nectria coccinea* var. *faginata*, continues to cause scattered dieback and chlorosis. In monitoring plots, *Nectria* fruiting has increased, although crown conditions have generally improved (Figure 3). Good growing conditions in 1989 and 1990 may be responsable for the trees' ability to remain healthy in spite of increased disease incidence.

Caliciopsis Canker, caused by *Caliciopsis pinea*, is widespread on overstocked or off-site trees. Twelve pole-sized trees in Springfield were dissected to determine whether Caliciopsis canker may affect the future value of the tree. The analysis is in progress. Generally, cankers did not kill the bark to the cambium. This suggests that defects will remain superficial.

OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Beech Bark Disease *Cryptococcus fagisuga* and *Nectria coccinea* var. *faginata*			See narrative.
Black Knot *Dibotryon morbosum*	Cherry	Widespread	Stable.
Butternut Canker *Sirococcus clavigignenta-juglandacearum*	Butternut	Widespread	Frequently found. Stable.
Caliciopsis Canker *Caliciopsis pinea*			See narrative.
Chestnut Blight *Cryphonectria parasitica*			No new reports.
Cytospora Canker *Leucostoma kunzei*	Blue Spruce	Rutland	Ornamentals. Disease incidence lower than normal.

OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Diplodia Shoot Blight *Diplodia pinea* *(Sphaeropsis pinea)*	Scots Pine	Shaftsbury	On dying trees in heavily used area.
Dutch Elm Disease *Ceratocystis ulmi*	Elm	Throughout	Stable.
Eastern Dwarf Mistletoe *Arceuthobium pusillum*			Not observed.
Fir Broom Rust *Melampsorella caryophyllacearum*	Balsam Fir	Plymouth	Light damage to forest trees.
Fireblight *Erwinia amylovora*	Hawthorn	Rockingham	Ornamental.
Hypoxylon Canker *Hypoxylon pruinatum*	Aspen	Widespread	Often seen on field edges.
Maple Canker *Steganosporium sp.* *Nectria sp.*	Sugar Maple	Westminster	Associated with lower branch death of sugarbush trees.
Oak Wilt *Ceratocystis fagacearum*			No suspects seen by trained observers during aerial flights.
Phomopsis Canker *Phomopsis arnoldiae*			Not observed.
Phomopsis Gall *Phomopsis sp.*	Hickory	Springfield	Ornamentals.
Sapstreak *Ceratocystis coerulescens*	Sugar Maple	Whitingham	Stained roots associated with injuries from grazing and equipment.

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OTHER STEM DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Scleroderris Canker *Asocalyx abietina*			Not observed.
Sirococcus Shoot Blight *Sirococcus strobilinus*			Not observed.
Smooth Patch *Dendrothele macrodens*			Not observed.
Verticillium Wilt *Verticillium albo-atrum* or *V. dahliae*			Not observed.
White Pine Blister Rust *Cronartium ribicola*	White Pine	Winhall Rochester Andover	Causing significant mortality and top dieback in a sawlog sized stand, and heavy damage in young plantations. Stable elsewhere.
Woodgate Gall Rust *Endocronartium harknessii*	Scots Pine	Sudbury Pownal Bennington Shaftsbury Pittsford	Heavy damage to ornamental plantings. Light damage to Christmas trees.

Foliage Diseases

A **Needlecast of White Pine**, caused by an unknown fungus, was responsible for widely scattered symptoms on white pine in early June. Current growth was green, while last year's growth, on lower branches, was yellow. Often, affected trees were growing on sites with poor air drainage, or near water. Symptomatic needles dropped within a few weeks. No fungus structures were found on cast needles early in the season. Fruiting bodies produced on cast needles in the fall are being identified.

OTHER FOLIAGE DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Anthracnose *Gloeosporium spp.*	Butternut	Throughout	Occasionally observed. Much less common than 1990.
Apple Scab *Venturia inequalis*			Not observed.
Cedar-Apple Rust *Gymnosporangium juniperi-virginianae*			Not observed.
Cyclaneusma Needlecast (formerly Naemacyclus) *Cyclaneusma minus*	Scots Pine	Hubbardton Pownal	Moderate damage to Christmas trees.
European Larch Needlecast *Mycosphaerella laricina*			Not observed.
Fir-Fern Rust *Uredinopsis mirabilis*	Balsam Fir	Widely scattered	Very light damage.
Horsechestnut Leaf Blotch *Guignardia aesculi*	Horsechestnut	Rutland Weathersfield	Ornamentals.
Lophodermium Needlecast *Lophodermium seditiosum*			Not observed.

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OTHER FOLIAGE DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Peach Leaf Curl *Taphrina deformans*	Peach	Springfield	Ornamentals.
Phyllosticta Leafspot *Phyllosticta sp.*	Red Maple	Bennington County Guilford	Ornamentals and forest trees.
Pine Needle Rust *Coleosporium asterum*	Red Pine	Bennington	Single tree.
Poplar Leaf Bronzing Virus or virus-like casual agent			Not observed.
Rhabdocline Needlecast *Rhabdocline pseudotsugae*	Douglas Fir	Bennington County Vernon Pittsford	Generally light damage to Christmas trees. Heavy damage to occasional ornamentals.
Rhizosphaera Needlecast *Rhizosphaera kalkhoffi*	Blue Spruce	Bennington County	Generally light damage to occasional Christmas trees and ornamentals.
Sooty Mold *Perisporiaceae*	Balsam Fir	Ludlow Mt. Holly	Heavy in Christmas tree plantations following heavy balsam twig aphid damage.
Swiss Needlecast *Phaeocryptopus gaumanni*	Douglas Fir	Springfield Pittsford	Heavy damage to Christmas trees.
Tar Spot *Rhytisma acerinum*	Red Maple	Dover Winhall	Ornamentals and forest trees.

ROOT DISEASES

DISEASE	HOST(S)	LOCALITY	REMARKS
Annosus Root Rot *Heterobasidion annosum*	White Pine	Weathersfield	Causing butt rot and windthrow.
Shoestring Root Rot *Armillaria spp.*	Balsam Fir	Bennington County	Widely scattered on ornamental and forest trees.
Xylaria Root Rot *Xylaria sp.*			Not observed.

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DIEBACKS, DECLINES, AND ENVIRONMENTAL DISEASES

Ash Dieback remains common, at stable levels. Dieback is most obvious in low elevation sites with a high stocking of pole-sized trees.

Birch Decline was not observed. However, widespread birch defoliation, combined with dry summer weather, is expected to cause dieback in the future.

Drought conditions in June, which persisted throughout the summer, led to widespread symptoms on trees growing under stressed conditions. In July, some sugar maples dropped leaves and some apples dropped their fruit. By the end of the summer, ornamental sugar maples with girdling roots, trees planted too deep, trees on wet sites, and wounded trees began to show substantial dieback. Additional symptoms are expected to show up in the next couple of years.

Hailstones the size of golf balls caused some local defoliation in Shaftsbury.

Higrading in the past has led to general poor health of predominantly red maple stands on shallow sites in Glastonbury and mixed hardwood stands in Woodford. At the Woodford sites, past cutting and beech bark disease have led to a dense, large-sapling sized understory of susceptible beech.

Ice Damage from a storm in November caused scattered damage at high elevations in Rutland County.

Improper Planting, exacerbated by dry summer conditions, was responsible for dieback on ornamental maples throughout the region. Affected trees, many of which were 20-40 years old, were planted too deep or had girdling roots. Planting too deep was also responsible for mortality of hemlocks and white pines.

Larch Decline was not observed progressing in old areas.

Lightning killed a large group of balsam fir Christmas trees in Weston.

Maple Decline was observed among ornamental maples growing under stressed conditions and where the was higrading in the past on poor sites. In general, maple looked healthy all season because of a vigorous flush of leaves in the spring. Dry conditions are expected to lead to some decline next year on poor sites, and where trees have been stressed.

Wet Site conditions were responsible for mortality of white pine in Winhall and Norwich, red pines in Middletown Springs, red oaks in Brattleboro, and for chlorosis of white spruce Christmas trees in Pownal. High water levels in marginally wet sites during the wet growing seasons in 1989 and 1990 brought on the decline.

White Pine Browning was widespread in early June, when 910 acres were mapped during aerial surveys (Table 8). The damage is thought to have been due to winter injury. The symptoms were different from the needlecast of white pine which showed up at the same time, but in the lower crowns. Symptoms similar to semi-mature tissue needle blight, with variable tipburn among needles within a fascicle of the current growth, were reported from Hartland and Springfield in late July.

Table 8. **Mapped acreage of white pine browning.**

Town	Acres Mapped
Bennington	50
Glastonbury	200
Manchester	160
Rupert	80
Sandgate	150
Bennington County	640
Benson	40
Sherburne	90
Rutland County	130
Chester	20
Hartland	30
Pomfret	20
Weathersfield	30
Weston	40
Windsor County	140
Total Mapped	910

Winter Injury was responsible for mortality of recently planted arborvitae in Rutland, an established planting of hemlocks in Barnard, and winter browning of white pine.

Wounding, exacerbated by drought, led to dieback on ornamental maples and oaks throughout the region.

ANIMAL DAMAGE

ANIMAL	SPECIES DAMAGED	LOCALITY	REMARKS
Beaver	Many	Throughout	Remains stable.
Deer	Balsam Fir	Shaftsbury	Stem damage to Christmas trees.
Grosbeaks			Not observed.
Moose			Not observed.
Mouse			Not observed. Down from occasional heavy damage in 1990.
Porcupine			Not observed.
Sapsucker	Scots Pine	Sudbury	Ornamental planting. Fewer complaints than in the past.
Squirrel	Tubing	Poultney	Heavy damage.